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Europäisches Patentamt  
European Patent Office  
Office européen des brevets

⑪ Publication number:

**0 092 535  
B1**

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## EUROPEAN PATENT SPECIFICATION

⑬ Date of publication of patent specification: 27.07.88

⑭ Int. Cl.<sup>4</sup>: A 61 B 19/02, G 01 K 1/08

⑮ Application number: 83850096.5

⑯ Date of filing: 13.04.83

⑰ Fever thermometer protector.

⑱ Priority: 15.04.82 SE 8202377

⑲ Date of publication of application:  
28.10.83 Bulletin 83/43

⑳ Publication of the grant of the patent:  
27.07.88 Bulletin 88/30

㉑ Designated Contracting States:  
BE DE FR GB IT NL SE

㉒ References cited:  
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GB-A-1 098 790  
GB-A-1 583 760  
US-A-3 235 063  
US-A-3 469 685  
US-A-3 833 116  
US-A-3 847 280

The file contains technical information  
submitted after the application was filed and  
not included in this specification

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Courier Press, Leamington Spa, England.

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## Description

The present invention relates to a protector for fever thermometers, and a process for manufacturing such protectors.

Especially in hospitals, the use of fever thermometers, both rectally and orally, involves significant risk for spreading infection. To avoid this, in addition to washing, a disposable protector of plastic film is used, usually heat-welded to a suitable sack-shape on an appropriate backing material. Such protector is disclosed in US-A-3 847 280. The manufacturing costs are high and the waste in materials is great. The weld is liable to irritate the patient during rectal insertion of the thermometer and the contact between the plastic film and the thermometer is poor.

A protector of the type defined in the first part of independent claim 1 is known from US-A-3 833 115, wherein the protector film is formed of an elastic membrane. Due to this elasticity, spring biased retainers are needed to retain the membrane on the thermometer, the membrane further reverting to its original shape when removed from the thermometer. US-A-1 098 790 and US-A-3 469 685 disclose protectors wherein the protector film is not intrinsically expansible, so that it must be provided, before use, in a folded or rolled condition.

It has now been discovered that an exceptionally suitable thermometer protector as defined in independent claim 1 can be obtained by using a very expansible, essentially non-elastic, thin plastic film, which has been combined with a suitable backing material of sufficient stability to make handling of the above mentioned thin plastic film possible when applying it to the thermometer. The arrangement among others comprises firstly a thin, expansible but essentially non-elastic plastic film, and secondly an applied backing material of paper for example.

The thin, expansible plastic film can consist of one of many different known plastic materials, or mixtures or coextrusions thereof, e.g. EVA (ethylene Vinyl Acetate), EBA (ethylene Butyl Acrylate), PB (Poly Butylene), PVC (Poly Vinyl Chloride), LLDPE (Linear Low Density Poly Ethylene), SBS (Styrene Butadiene Styrene). The usable materials are characterised in that the expansibility must be at least 700%. The yield strength should not exceed 15 MPa, the rupture or breaking strength should not be less than 32 MPa, and is preferably about 40 MPa according to ISO Test Method R-1184. The thickness should suitably be between 0.005 and 0.1, preferably 0.010-0.040 mm.

The backing material can suitably consist of ordinary unbleached kraft paper with an area weight of 20-50 g per m<sup>2</sup>. Other material such as metal foil or plastic film of suitable thickness can also be used.

The backing material can also be provided with holes, perforations or slots so that the point of the thermometer covered with the expansible plastic film can easily penetrate the paper.

It is also possible to provide the fever thermometer protector with a lubricant to facilitate rectal use of thermometers provided with the protector. The lubricant, such as Vaseline®, is applied between the expansible film and the backing material. In this case, the backing material can be provided with rupture indications to facilitate penetration of the fever thermometer through the backing material instead of holes or perforations through the backing material.

A great advantage in this case is that the outer surface of the protector can be protected from dirt before use and if desired can even be kept sterile. A film made by a process in which the material is subjected to high temperatures at least some time during the process, will usually without special steps, be aseptic and thus a protector according to the invention will be sterile without sterilization.

The fastening together of the thin plastic film and the backing material can be done by known methods used in lamination of paper and plastic in the packaging industry. For example, the plastic film and the backing material in rolled web form can be rolled off individually from separate rolls, with strings of adhesive being applied to one surface. The materials are then brought together and rolled up in a single roll. If the backing material is suitably coated, the webs can be joined together by heating the materials as they converge.

The new protector according to the invention thus consists of a combination of a backing material and expansible, thin plastic film which can be easily handled, held in the hand or handled in a simple mechanical device.

According to a preferred embodiment of the fever thermometer protector, the protective material, prior to use by application to a fever thermometer, consists of an expansible plastic film with properties according to the claims with a backing material applied to and covering one side. For use, the sensor end of the fever thermometer is pressed from the plastic film side through the backing material which ruptures or through a hole therein. The protective film will cover the fever thermometer and the backing material will be at the opposite end of the fever thermometer. The backing material can also consist of annular, U-shaped or otherwise shaped means.

The application of the protector to the thermometer can be effected by holding the fever thermometer in one hand and the protector in the other hand and pushing the end of the fever thermometer against the center of the plastic film, thus pushing it through the backing material which is possibly provided with perforations or a hole. The thermometer is pushed hard enough so that the thin plastic film is stretched and clings to the thermometer. After penetration of the backing material, the backing material can be removed, if desired.

Application can also be effected by setting the thermometer in a suitable holder with the sensor point upwards. The protector can then be pushed

with both hands against the thermometer point with force sufficient to stretch the thin plastic film onto the thermometer.

After removal of the thermometer with protector, the protector is removed most suitably by pulling off the protector towards the thermometer point. The protective film is thus turned automatically inside-out, thereby enclosing any contaminants in the protector and keeping the thermometer clean.

The invention is shown in Figs 1—3, of which Fig 1 shows a protector according to the invention being applied to a fever thermometer. Fig 2 shows a device for manufacturing the protectors according to the invention and Fig 3 shows an alternative arrangement for making the protector according to the invention.

Fig. 1 shows a protector into which a thermometer 1 is pushed against an expansible film 2 in the direction of the arrow 3. The expansible film is fixed to a sheet of paper 4, provided with tear indications 6 for a hole 5.

Fig 2 shows schematically a process for manufacturing a fever thermometer protector according to Fig 1, in which the sheet of paper 4 is fastened to the expansible film by means of adhesive. A paper web 8 of continuous backing material is rolled off a roller 7 and rolls over a glue roller 9 placed in a glue trough 10, and continues to two guide rollers 11 and 12 where the paper is pressed together with a film web 13 with expansible film from a roll 14. The glued product is then rolled into a roll 15.

Finally, Fig. 3 shows an alternative arrangement for manufacturing the protector according to the invention. A paper web 16 with prestamped, continuous backing material is drawn from a roll 17 towards a pair of heated rollers 18 and 19, where the paper web 16 is heat-laminated to an expansible film web 20 from the roll 21. The expansible film and the paper web joined thereto are then drawn via the guide roller 22 to a storage roll 23.

#### Claims

1. A fever thermometer protector consisting of an expansible plastic film (2) fixed to a backing material (4) having low expansibility and elasticity, said plastic film having an expansibility of at least 700%, characterized in that said plastic film (2) has a thickness of between 0.005—0.1 mm, that the material of said plastic film is essentially non-elastic, has a breaking strength of at least 32 MPa and a yield point of below 15 MPa, these values being measured in accordance with ISO Test Method R—1184, whereby said protector, when applied on the thermometer is stretched and extended over its yield point so that the protector clings to the outside of the thermometer and when removed from the thermometer is pulled towards the end of the thermometer at the same time as it is automatically turned inside-out.

2. A protector according to Claim 1, characterized in that said backing material (4) is a paper

with an area weight of 20—50 g/m<sup>2</sup> provided with tear indications, holes or perforations suitably disposed for penetration by the point of the thermometer.

3. A protector according to Claim 2, characterized in that said plastic film is glued or welded to the backing material.

#### Patentansprüche

1. Schutzvorrichtung für ein Fieberthermometer, bestehend aus einer dehnbaren Kunststoffolie (2) die an einem Versteifungsmaterial (4) mit geringer Dehnbarkeit und Elastizität befestigt ist, wobei die Kunststoffolie eine Dehnbarkeit von mindestens 700% hat, dadurch gekennzeichnet, daß die Kunststoffolie (2) eine Dicke von 0,005 bis 0,1 mm hat, daß das Material der Kunststoffolie im wesentlichen unelastisch ist, eine Bruchfestigkeit von mindestens 32 MPa und eine Fließgrenze von weniger als 15 MPa hat, wobei diese Werte nach dem ISO Testverfahren R—1184 ermittelt werden, wodurch die Schutzvorrichtung beim Anbringen auf das Thermometer über ihre Fließgrenze hinaus gedehnt wird, so daß sich die Schutzvorrichtung an den Außenumfang des Thermometers anschmiegt und daß sie bei der Beseitigung von dem Thermometer zum Ende des Thermometers hin gezogen wird, während sie gleichzeitig selbsttätig gewendet wird.

2. Schutzvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Versteifungsmaterial (4) Papier mit einem spezifischen Gewicht von 20 bis 50 g/m<sup>2</sup> ist, das mit Schwächungslinien, Löchern oder Perforationen versehen ist, die zum Durchstechen durch die Spitze des Thermometers geeignet angeordnet sind.

3. Schutzvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Kunststoffolie mit dem Versteifungsmaterial verklebt oder verschweißt ist.

#### Revendications

1. Dispositif de protection pour thermomètre médical, constitué d'un film plastique extensible (2) fixé sur un matériau support (4) présentant une extensibilité et une élasticité faibles, le film plastique présentant une extensibilité d'au moins 700%, caractérisé en ce que le film plastique (2) a une épaisseur comprise entre 0,005 et 0,1 mm, en ce que le matériau du film plastique est essentiellement non-élastique, présente une résistance à la rupture d'au moins 32 MPa et une limite élastique inférieure à 15 MPa, ces valeurs étant mesurées conformément à la méthode d'essai ISO R—1184, de sorte que le dispositif de protection, quand on l'applique sur le thermomètre, est étiré et étendu au-delà de sa limite élastique et colle à l'extérieur du thermomètre, et, quand on le retire du thermomètre, est tiré vers l'extrémité du thermomètre en étant en même temps automatiquement retourné à l'envers.

2. Dispositif de protection conforme à la revendication 1, caractérisé en ce que le matériau

soutien (4) est un papier présentant une masse par unité de surface de 20 à 50 g/m<sup>2</sup> muni d'indications de déchirement, de trous ou de perforations disposés convenablement pour permettre la pénétration par la pointe du thermomètre.

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3. Dispositif de protection conforme à la revendication 2, caractérisé en ce que le film plastique est collé ou soudé au matériau support.

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